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Intergradation in Worm Snakes (*Carphophis*) from Kentucky

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Among a collection of amphibians and reptiles from Kentucky collected by William F. Ross and presented to The Chicago Academy of Sciences, is a series of worm snakes, *Carphophis*, which are intermediate between *C. amoena amoena* and *C. amoena helenae*.

Carphophis a. amoena is generally considered to range along the eastern seaboard into Florida and west into the Appalachian Mountains, while *helenae* ranges to (?) the Appalachians from the west (Schmidt and Davis, 1941, p. 102; Stejneger and Barbour, 1943, p. 118-9). Although both Blanchard (1925, p. 528) and Schmidt and Davis (*op. cit.*) refer to intergrades, no actual data regarding the manner of intergrading are offered. As the present series reported upon were all collected during the same year in approximately the same locality near Middlesboro, Bell County, Kentucky, they may be considered as representative of the population occurring in and about that area. Middlesboro lies just to the west of the Appalachian Mountains and within the range of *helenae*.

Blanchard (*op. cit.*) characterizes the subspecies *amoena* as a snake in which the internasals and prefrontals are usually separated, while in *helenae* these scales are united into two large shields. Six of the 17 specimens from Middlesboro have the internasals and prefrontals fused into two large shields, while one has the internasal and prefrontal scute of the right side fused into one large scale, and those of the left side remain separated (Table I). Ten have the internasals and prefrontals separated, although one of these has the internasals reduced to about one-fourth of their normal size, with a consequent enlarging of the prefrontals.

Blanchard further states that two scales are normally present after the first temporal in both *amoena* and *helenae*, and only one in *vermis*. Only one specimen of the Bell County series has two scales after the first temporal, the other 16 having just one. The range for the ventrals in male *amoena* is given by Blanchard as 113 to 128 (average 121) and for male *helenae* as 113 to 127

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(average 118); in female *amoena* he gives the range as 122 to 140 (average 131), in female *helenae* from 122 to 137 (average 128). The ventrals of the nine males in this series vary from 106 to 120 (average 111) and in the eight females from 107 to 126 (average 117). The Kentucky specimens tend to the lower ventral count of *helenae*. The scale rows throughout the series are 13, and there is no preocular and but one postocular. There are five upper lab-

T A B L E I

VARIATION OF CARPHOPHIS IN BELL COUNTY, KENTUCKY

C.A.S. No.	Sex	Internasals and	Ventrals	Caudals	Length in mm.	
		Prefrontals			Total	Tail
13656	m	Fused on right side only	106	35	200	36
13657	m	fused	112	36	192	35
13 660	m	separate	109	35	223	40
13 724	m	separate	109	34	172	32
13725	m	fused	110	36	212	39
13726	m	fused	114	37	166	32
13879	m	separate	120	30	232	39
13880	m	separate	110	34	200	39
13881	m	separate	110	36	*	*
13658	f	separate	119	28	244	36
13659	f	fused	126	26	198	26
13 661	f	separate-	122	26	211	27
13723	f	fused	110	28	245	35
13878	f	separate	120	27	158	22
13895	f	separate	114	29	258	40
13896	f	fused	118	27	232	35

*Damaged, no length taken.

Internasals extremely small.

ials and six lower labials, except for one specimen which has seven lower labials. Caudals in the males vary from 30 to 36 (average 34) and in the females from 26 to 29 (average 27.5). The total length of the males varies from 166 to 232 mm. (average 200 mm.), the tail length from 32 to 40 mm. (average 36 mm.); in the females total length varies from 158 to 258 mm. (average 223 mm.), while tail length varies from 22 to 40 mm. (average 32 mm.).

Mr. Ross collected specimens on June 7, 1946, at 1250 feet elevation at Middlesboro (No. 13656-61); on July 14-20, 1946, at an altitude of 1300 feet,

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one and one-half miles south of Middlesboro (No. 13722-6); on October 25, 1946 at 1200 feet at Middlesboro (No. 13878-81); and on May 23, 1946, at Middlesboro (?) (No. 13895-6).

It seems evident that the population about Middlesboro is an intergrading population between *amoena* and *helenae*, tending presumably more to *helenae*. In this area, at least, *amoena* seems to be ranging westward over the Appalachians, meeting *helenae* at the base of the mountains.

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Natural History Miscellanea, a series of miscellaneous papers initiated in 1946 as an outlet for original articles, more or less technical in nature, one to four pages in length, in any field of natural history. Individual issues, published at irregular intervals, are numbered separately and represent only one field of specialization; e. g., botany, geology, entomology, herpetology, etc. The series is distributed to libraries and scientific organizations with which the Academy maintains exchanges. A title page and index will be supplied to these institutions when a sufficient number of pages to form a volume have been printed. Individual specialists with whom the museum or the various authors maintain exchanges receive those numbers dealing with their particular fields of interest. A reserve is set aside for future exchanges and a supply of each number is available for sale at a nominal price. Authors may obtain copies for their personal exchanges at the prevailing rates for similiar reprints.

H. K. Gloyd, Director of the Museum.

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